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PETROLEUM COMPONENTS AS POTENTIAL PARTICIPANTS OF REDOX REACTIONS IN ANIMALS

G. A. Triandafilova, E. I. Yakovleva, A. S. Shirkunov, O. P. Krasnykh

Perm National Research Polytechnic University, 29 Komsomolky Ave, Perm, 614990, Russia.
E-mail: lindick@ya.ru

Abstract. Oil production, its transportation and refining, in spite of precautions, may lead to various hydrocarbon components entering the environment due to unwanted events. Migration of oil components results in the significant increase of the affected area and level of negative impact on biocenoses. It is important to assess the complex effects of hydrocarbons mixtures, taking into account the possible transformations and synergistic effects of components belonging to different fractions on biological systems. The involvement of hydrocarbons in redox processes can affect the vital systems of organisms in the biocenosis. In mammals, erythrocytes are particularly susceptible to oxidative damage due to their specific role as oxygen carriers.[1]

Three samples were studied, which are products of oil refining: mazut - the residue obtained by rectification of a mixture of West Siberian oils at atmospheric pressure and that is a mixture of hydrocarbons with a boiling point of more than 350° C with a small amount of heteroatomic compounds (sulfur content in the sample is 2.65 wt%), light (LCGO) and heavy (HCGO) cycle gas oils which are fractions enriched with arenes, including polycyclic, nitrogen, oxygen and sulfur compounds (mainly thiophene derivatives)).

The radical binding activity was assessed using a peroxyl free radical generator 2,2'-azobis (2-methylpropionamidine) dihydrochloride[2]. It was found that the LCGO and HCGO fractions dissolved in DMSO have a higher radical-binding activity than the mazut components extracted in DMSO.

Table

	Radical binding activity, %*			Erythrocyte hemolysis, %*			
	0,1 mg/ml	0,01 mg/ml	0,001 mg/ml	DMSO	0,1 mg/ml	0,01 mg/ml	0,001 mg/ml
LCGO	80	26	2	18	20	16	15
HCGO	84	40	8		-**	15	17
Mazut	40	9	0		16	16	22

* - mean value for two independent experiments
** - the result is not reproduced

Additionally, a study of the toxic effect of the extracted fractions on the erythrocytes of rats was conducted. After 24 hours of incubation at 37 ° C, only a slight effect on autohemolysis of erythrocytes was observed for several solutions (Table). The study of the morphology of erythrocytes carried out using a BIOMED-6 microscope (TOUPCAM camera, initial magnification x400) also showed no significant effect of the studied samples.

References

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